

ZIMLICH, David A.
Serial No.: 09/620,140
Response to Office Action dated March 29, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in this application.

Listing of Claims:

Claim 1 (Currently Amended): A driver circuit for driving signal lines of a matrix type display device, comprising:

 pulsewidth modulation circuitry for generating pulsewidth modulated video data; and

 driver circuitry including latch circuits for latching the pulsewidth modulated video data and driving said signal lines in accordance with the latched data,

wherein output circuits each comprising at least two series-connected gate circuits are respectively associated with each of the signal lines and each latch circuit is connected to one of the gate circuits of a corresponding output circuit.

Claim 2 (Previously Presented): The driver circuit according to claim 1, wherein said driver circuitry level-shifts the pulsewidth modulated video data.

Claim 3 (Previously Presented): The driver circuit according to claim 1, wherein said pulsewidth modulation circuitry comprises a programmable logic array.

Claim 4 (Previously Presented): The driver circuit according to claim 1, wherein said pulsewidth modulation circuitry comprises an application specific integrated circuit.

Claim 5 (Original): The driver circuit according to claim 1, wherein said signal lines are connected to emitter elements of a field emission display.

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Claim 6 (Original): The driver circuit according to claim 1, wherein said pulsedwidth modulation circuitry generates the pulsedwidth modulated video data based on RGB video data supplied thereto.

Claim 7 (Original): The driver circuit according to claim 1, wherein said driver circuitry is provided on a chip other than a chip on which said pulsedwidth modulation circuitry is provided.

Claim 8 (Original): The driver circuit according to claim 1, wherein said driver circuitry comprises driver circuits that are loaded in parallel with the pulsedwidth modulated video data.

Claim 9 (Currently Amended): A matrix type display device comprising:
display elements connected to row lines and column lines; and
a driver circuit for driving said column lines, said driver circuit comprising:
pulsedwidth modulation circuitry for generating pulsedwidth modulated video data; and
driver circuitry including latch circuits for latching the pulsedwidth modulated video data and driving said column lines in accordance with the latched data,
wherein output circuits each comprising at least two series-connected gate circuits
are respectively associated with each of the signal lines and each latch circuit is
connected to one of the gate circuits of a corresponding output circuit.

Claim 10 (Previously Presented): The matrix type display device according to claim 9, wherein said driver circuitry level-shifts the pulsedwidth modulated video data.

Claim 11 (Original): The matrix type display device according to claim 9, wherein said display device is a field emission display device.

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Claim 12 (Original): The matrix type display device according to claim 9, wherein said display device is a plasma display device.

Claim 13 (Original): The matrix type display device according to claim 9, wherein said pulsedwidth modulation circuitry comprises a programmable logic array.

Claim 14 (Original): The matrix type display device according to claim 9, wherein said pulsedwidth modulation circuitry comprises an application specific integrated circuit.

Claim 15 (Original): The matrix type display device according to claim 9, wherein said pulsedwidth modulation circuitry generates the pulsedwidth modulated video data based on RGB video data supplied thereto.

Claim 16 (Original): The matrix type display device according to claim 9, wherein said driver circuitry is provided on a chip other than a chip on which said pulsedwidth modulation circuitry is provided.

Claim 17 (Original): The matrix type display device according to claim 9, wherein said driver circuitry comprises driver circuits that are loaded in parallel with the pulsedwidth modulated video data.

Claim 18 (Currently Amended): A method of driving signal lines of a matrix type display device, comprising:
generating pulsedwidth modulated video data;
latching the pulsedwidth modulated video data into latch circuits; and
driving said signal lines in accordance with the latched data,
wherein the latched data is provided from the latch circuits to output circuits
respectively associated with each of the signal lines, each output circuit comprising at
least two series-connected gate circuits.

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Claim 19 (Original): The method according to claim 18, wherein said matrix type display device is a field emission display device.

Claim 20 (Original): The method according to claim 18, wherein said matrix type display device is a plasma display device.

Claim 21 (Original): The method according to claim 18, wherein the pulsedwidth modulated video data is generated based on RGB video data.

Claim 22 (Currently Amended): A driver circuit for driving signal lines of a matrix type display device, comprising:

 pulsedwidth modulation circuitry for generating pulsedwidth modulated video data; and

 driver circuitry including latch circuits for latching the pulsedwidth modulated video data and output transistors for driving said signal lines in accordance with the latched data,

wherein said output transistors include series-connected N-channel and P-channel transistors associated with each signal line, wherein an output of a corresponding latch circuit is supplied to a control terminal of one of the N-channel and P-channel transistors.

Claim 23 (Previously Presented): The driver circuit according to claim 22, wherein a single latch circuit is provided for each signal line.

Claim 24 (Previously Presented): The driver circuit according to claim 22, further including a data buffer whose outputs are selectively latched into said latch circuits in accordance with latch enable signals.

Claim 25 (Canceled).

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Claim 26 (Previously Presented): The driver circuit according to claim 1, further comprising:
latch enable buffers.

Claim 27 (Previously Presented): The driver circuit according to claim 1, wherein the driver circuitry is supplied with one or more latch enable signals for latching the pulsedwidth modulated video data.

Claim 28 (Previously Presented): The matrix type display device according to claim 9, wherein the driver circuitry of the driver circuit further comprises latch enable buffers.

Claim 29 (Previously Presented): The matrix type display device according to claim 9, wherein the driver circuitry of the driver circuit is supplied with one or more latch enable signals for latching the pulsedwidth modulated video data.

Claim 30 (Currently Amended): A matrix type display device comprising:
display elements connected to row lines and column lines; and
a driver circuit for driving said column lines, said driver circuit comprising:
pulsedwidth modulation circuitry for generating pulsedwidth modulated video data;

driver circuitry for level-shifting the pulsedwidth modulated video data and outputting the level-shifted data as column signals to the column lines; and

a data buffer for buffering the pulsedwidth modulated video data and supplying the buffered data to the driver circuitry,

wherein the driver circuitry comprises a plurality of multi-bit circuits, each multi-bit circuit comprising a plurality of registers, and

wherein n-bits are provided in series to each register of the multi-bit circuits during a pulsedwidth modulated video data cycle.

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Claim 31 (Currently Amended): The matrix type display device according to claim 30, wherein ~~the driver circuitry comprises a plurality of multi-bit circuits and~~ respective enable signals are provided to the multi-bit circuits to load the contents of the data buffer therein.

Claim 32 (Previously Presented): The matrix type display device according to claim 31, further comprising:

an enable signal buffer for outputting the enable signals to the multi-bit circuits.

Claim 33 (Previously Presented): The matrix type display device according to claim 31, wherein the contents of the data buffer are loaded in parallel to the one of the multi-bit circuits designated by the enable signals.

Claim 34 (Currently Amended): The matrix type display device according to claim 30, wherein ~~the driver circuitry comprises a plurality of multi-bit circuits, each multi-bit circuit comprising a plurality of registers each includes including~~ a respective flip-flop.

Claim 35 (Canceled).

Claim 36 (Previously Presented): The matrix type display device according to claim 30, wherein the driver circuitry comprises four multi-bit circuits and respective enable signals are provided for sequentially loading the contents of the data buffer to each of the four multi-bit circuits.